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REVISION OF THE SOUTH AMERICAN GENERA *ALLOTRUXALIS* REHN AND *EUTRYXALIS* BRUNER (ORTHOPTERA: ACRIDIDAE: HYALOPTERYGINI)

Revisión de los géneros sudamericanos *Allotruxalis* Rehn y *Eutryxalis* Bruner (Orthoptera: Acrididae: Hyalopterygini)

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RESUMEN

En este estudio se redescriben los géneros *Allotruxalis* y *Eutryxalis* con base en caracteres de la morfología externa y la genitalia. El género *Allotruxalis* constaba de dos especies: *A. gracilis* y *A. strigata*, las cuales eran separadas con base en caracteres de la morfología externa. El análisis llevado a cabo en este estudio mostró que los caracteres de la morfología externa no permiten separar estas dos especies. Caracteres derivados de la genitalia interna son decisivos para postular a *A. strigata* como sinónimo de *A. gracilis*. El género *Eutryxalis* poseía a la especie *E. filata* y tres subespecies: *E. f. filata*, *E. f. minor*, y *E. f. bellula*, las cuales estaban descritas con base en caracteres de la morfología externa. Se llevó a cabo un análisis multivariado y se demuestra que los caracteres utilizados no permiten distinguir las tres entidades. Por lo tanto, se postula que las anteriores subespecies son sinónimos de *E. filata*.

Palabras clave. Acrididae, *Allotruxalis*, *Eutryxalis*, Hyalopterygini, Sistemática.

ABSTRACT

In this study *Allotruxalis* and *Eutryxalis* are re-described based on characters from the external morphology and genitalia. The genus *Allotruxalis* comprised two species: *A. gracilis* and *A. strigata*, that were described based mostly on characters from external morphology. The morphological analysis conducted in this study showed that external morphological characters do not permit separation of these two species. Characters from internal genitalia are decisive to postulate *A. strigata* as a junior synonym of *A. gracilis*. The genus *Eutryxalis* comprised one species: *E. filata*, and three subspecies: *E. f. filata*, *E. f. minor*, and *E. f. bellula*, that also were described based mostly on characters from external morphology. A multivariate analysis was carried out and showed that these characters do not allow one to distinguish the three entities. Therefore, I postulate these subespecies as junior synonyms of *E. filata*.

Key words. Acrididae, *Allotruxalis*, *Eutryxalis*, Hyalopterygini, Systematics.

INTRODUCTION

According to Amedegnato (1974) and Carbonell (1998) the genera *Eutryxalis* Bruner and *Allotruxalis* Rehn belong to the tribe Hyalopterygini within the subfamily Acridinae (Orthoptera, Acrididae). Following the biogeographical schemes of Cabrera & Willink (1973), the known geographic distribution of *Eutryxalis* comprises the Guajira province of the Caribe domain, Savanna, Amazon, Atlantic, Cerrado, and Yungas provinces of the Amazonian domain, Desert province of the Andean- Patagonian domain, and Chacoan, Parana, and Pampean provinces of the Chacoan domain, all of them belonging to the Neotropical region. Whereas the known geographic distribution of *Allotruxalis* is in the Chacoan, Espinal, Pampean, and Monte provinces of the Chacoan domain and the Amazon and Paranean provinces of the Amazonian domain, both domains included in the Neotropical region.

The genus *Allotruxalis* is graminivorous and occurs in prairies, savanna, or other type of open grasslands. It prefers low, rather humid fields with dense grass cover, but it is also found in dry rocky situations with sparse grass vegetation (COPR 1982). *Allotruxalis* appears to be highly selective in their graminivory (Gangwere & Ronderos 1975).
These genera deserve to be addressed simultaneously because they share a common taxonomic history. The genus *Eutryxalis* was erected by Bruner (1900) for *Metaleptea minor* Giglio- Tos, 1897 and included *E. minor* and the new species *E. strigata* without type species designation. Rehn (1906) studied Bruner's material of the genus *Eutryxalis* and concluded that *E. minor* specimens belong to *Hyalopteryx gracilis* Giglio- Tos, 1897; therefore, he established the new combination *E. gracilis* (Giglio- Tos) and designated *Hyalopteryx gracilis* Giglio-Tos, 1897 as type species. Posteriorly Rehn (1916) described the genus *Paratruxalis* for *P. filatus* (Walker, 1870) and fixed *Chrysochraon filatus* Walker, 1870 as type species. In 1944, Rehn considered that his previous designation (Rehn 1906) had been made on the basis of a misidentification, therefore he pointed out that the fixation of the type species made by him in 1906 must be interpreted as *Metaleptea minor* Giglio-Tos, 1897 and established *Paratruxalis* as synonym of *Eutryxalis*. As a result of this, Rehn (1944) re- defined the genus *Eutryxalis* and included within it the species *E. filata* (Walker) with three subspecies: *E. filata filata*, *E. filata minor* and *E. filata bellula*. In addition, he (Rehn 1944) named the new genus *Allotruxalis* for *E. gracilis* and *E. strigata* with *Hyalopteryx gracilis* Giglio-Tos, 1897 as type species.Upon the examination of the external morphology and internal genitalia of both sexes of genera *Allotruxalis* and *Eutryxalis*, I have concluded that, in the case of *Allotruxalis*, *A. strigata* is a junior synonym of *A. gracilis* (Art. 23.1, ICZN 2000); whereas for *Eutryxalis*, I have concluded that *E. filata filata*, *E. filata minor* and *E. filata bellula* are junior synonyms of *E. filata* (Art. 23.1, ICZN 2000).Therefore, the main objectives of this paper are to re- describe the genera *Allotruxalis* and *Eutryxalis* and to clarify the taxonomic status of their components.

MATERIALS AND METHODS

The specimens examined for this study are deposited in the following institutions: Academy of Natural Sciences of Philadelphia (Philadelphia, United States, ANSP), Department of Entomology, University of Nebraska State Museum (Lincoln, United States, UNSM), Museo Regionale di Scienze Naturali (Torino, Italy, MRSN), Facultad de Ciencias, Universidad de Montevideo (Montevideo, Uruguay, FHCM), Museo Argentino de Ciencias Naturales "Bernardino

Rivadavia" (Buenos Aires, Argentina, MACN), Museo de La Plata (Argentina, MLP).

Male and female genitalia.- Museum specimens were softened with ammonia before dissection of the phallic complex and female genitalia; phallic complexes and female genitalia were then cleared in potassium hydroxide and stored in glycerin.

Illustrations.- Phallic complex of male and female subgenital plate were illustrated based on observations conducted using a binocular microscope with ocular grid. A camera lucida was used for the drawings of external morphology.

Rehn described the three subspecies of *Eutryxalis* on the basis of meristic characters and he mentioned in this paper that (Rehn 1944: 208) "The three subspecies into which *filata* is here divided are readily recognizable on comparison of material, but, as their features of difference are largely of degree, the association of single individuals is less easy." I measured these characters and I performed a multivariate analysis taking into account the following assumption: I considered that the specimens belonging to a locality within the distribution area of *E. f. filata* as described by Rehn (1944) were representative of this subspecies. The same procedure was made for the other two subspecies.

Rehn (1944) distinguished typical *E. f. filata* that occurs in Rio de Janeiro (Brazil) and intermediate forms between *E. f. filata* and *E. f. minor* and atypical forms in Mato Grosso (Brazil), northeastern Paraguay and the Chaco region of Argentina. For *E. f. minor* typical forms are distributed in northwest Argentina and central Bolivia, intermediate forms between *E. f. minor* and *E. f. filata* in eastern Bolivia up to Rio Paraguay (Paraguay), intermediate forms between *E. f. minor* and *E. f. bellula* in central- north of Peru and south of Colombia, and atypical forms in north of Bolivia and south Peru. In *E. f. bellula* its typical condition appears in the vicinity of the coastal mountains of north- central and of the Merida Andes of western Venezuela, the Sierra Nevada de Santa Marta and at least portions of the northern sector of the Cordillera Oriental of northeastern Colombia, and intermediate forms between *E. f. bellula* and *E. f. minor* in Choachí, Cundinamarca, and Villavicencio, Meta, Colombia.

Multivariate analysis.- This study was based on museum material from the Museo de La Plata (MLP), Museo de Ciencias Naturales "Bernardino Rivadavia" (MACN), Facultad de Ciencias, Universidad de Montevideo, Uruguay (FHCM) and the Academy of Natural Sciences of Philadelphia (ANSP). A total of 105 male specimens were examined for the three subspecies. The analysis was not carried out in female specimens because the number of specimens was not a representative sample. In those localities where more than one specimen was available, I measured each one of them and calculated the mean value. Number of specimens, locality, collection data and acronyms are listed in Appendix I.

The characters used in the analysis were those that Rehn (1944) mentioned to separate the three subspecies.To perform the multivariate analysis I selected an ordination method (principal component analysis, PCA, Blackith & Reyment 1971) because it has the advantage of indicating the relative contribution of each character to each vector. PCA was based on the Pearson product- moment correlation coefficient (Michener & Sokal 1957). The NT- SYS pc program, version 2. 0 (Rohlf 1998) was used in the analysis.

Measurements.- An ocular micrometer in a dissecting microscope was used to take the following measures: total body length from the fastigium apex to the end of tegmina (BL), in lateral view; length of fastigium (LF) was measured from the anterior margin of eye to the frontal costa, in dorsal view; width of fastigium (WF) was measured at the base of fastigium, in dorsal view; width of head at eyes (WE) was taken in its maximum width between eyes, in dorsal view; width of head (WH) was measured at genae, in dorsal view; length of pronotum (LP) was measured along the midline, in dorsal view; length of tegmina (LT) was taken from the proximal visible end of the costal margin to its apex, in lateral view. One of the characters that Rehn (1944) used to separate the three subspecies is the degree of prominence of the eyes in dorsal view. This character was included in the analysis and calculated as the ratio of measures WE and WH mentioned above.

Allotruxalis Rehn, 1944
(Figs. 1 A- G, 2 A- H, 3)

Type species: *Hyalopteryx gracilis* Giglio-Tos, 1897 by subsequent designation (Art. 69.1, ICZN 2000).

> *Hyalopteryx*: Giglio- Tos, 1897: 21 (in part).
> *Eutryxalis* Bruner, 1900: 24 (*sensu* Bruner); Rehn, 1906: 15; Liebermann, 1939: 148; Hepper, 1945: 281.
> *Allotruxalis* Rehn, 1944: 198 (type species: *Hyalopteryx gracilis* Giglio- Tos, 1897); Jago, 1971: 212 (discussion of type species); Amedegnato, 1974: 202; Otte, 1995: 249; Otte & Naskrecki, 1997: Orthoptera Species File On Line; Carbonell, 1998: 86.

Types examined.- Of *Eutryxlis strigata*, a female in UNSM labeled: Holotype, Santa Fe, Carcarañá, 30 sep 1897; this locality is situated in Argentina. Type of *Hyalopteryx gracilis*, a male in MRSN labeled: Hololectotype (established by Carbonell in 1966), San Lorenzo; this locality is situated in Bolivia. Type of *Metaleptea minor*, a female in ANSP labeled: Caiza; this locality is situated in Bolivia, this specimen is cited by Rehn (1944) in material examined as “paratype, ex Turin Museum”. Type of *Eutryxalis minor*, a male in ANSP labeled: paratype, Carcaraña, Santa Fe; this locality is situated in Argentina, this specimen is cited by Rehn (1944) in material examined as “paratype, ex Turin Museum”.

TAXONOMY

Bruner (1900) described the genus *Eutryxalis* for what he believed was the species *Metaleptea minor* Giglio- Tos, 1897 and for the new species *Eutryxalis strigata*. Rehn (1906), based on cotypic material of Giglio- Tos’ *Metaleptea minor* and specimens determined in 1900 by Bruner as *Eutryxalis minor*, considered that the two concepts were not even cogeneric and that the species regarded as *minor* by Bruner was really the one described by Giglio- Tos in 1897 as *Hyalopteryx gracilis*. As no type species had been indicated until that time for *Eutryxalis*, Rehn (1906) proceeded to indicate “*Metaleptea minor* Bruner (not of Giglio- Tos) (= *Hyalopteryx gracilis* Giglio- Tos)” as the type.

Rehn considered that he had mistakenly selected the type species for *Eutryxalis*, because it was based upon a misidentification and thus (Rehn 1944: 198) “the 1906 fixation must be interpreted as fixing *Metaleptea minor* Giglio- Tos, as the type species of *Eutryxalis* Bruner, even though Bruner had no properly interpreted Giglio- Tos’ species”. So, he (Rehn 1944) re- defined the present genus, designated *Hyalopteryx gracilis* Giglio- Tos as the type species and named it *Allotruxalis*.

Jago (1971) misunderstood that Rehn (1906) designated *Hyalopteryx gracilis* Giglio- Tos (instead of *Metaleptea minor* Giglio- Tos) as

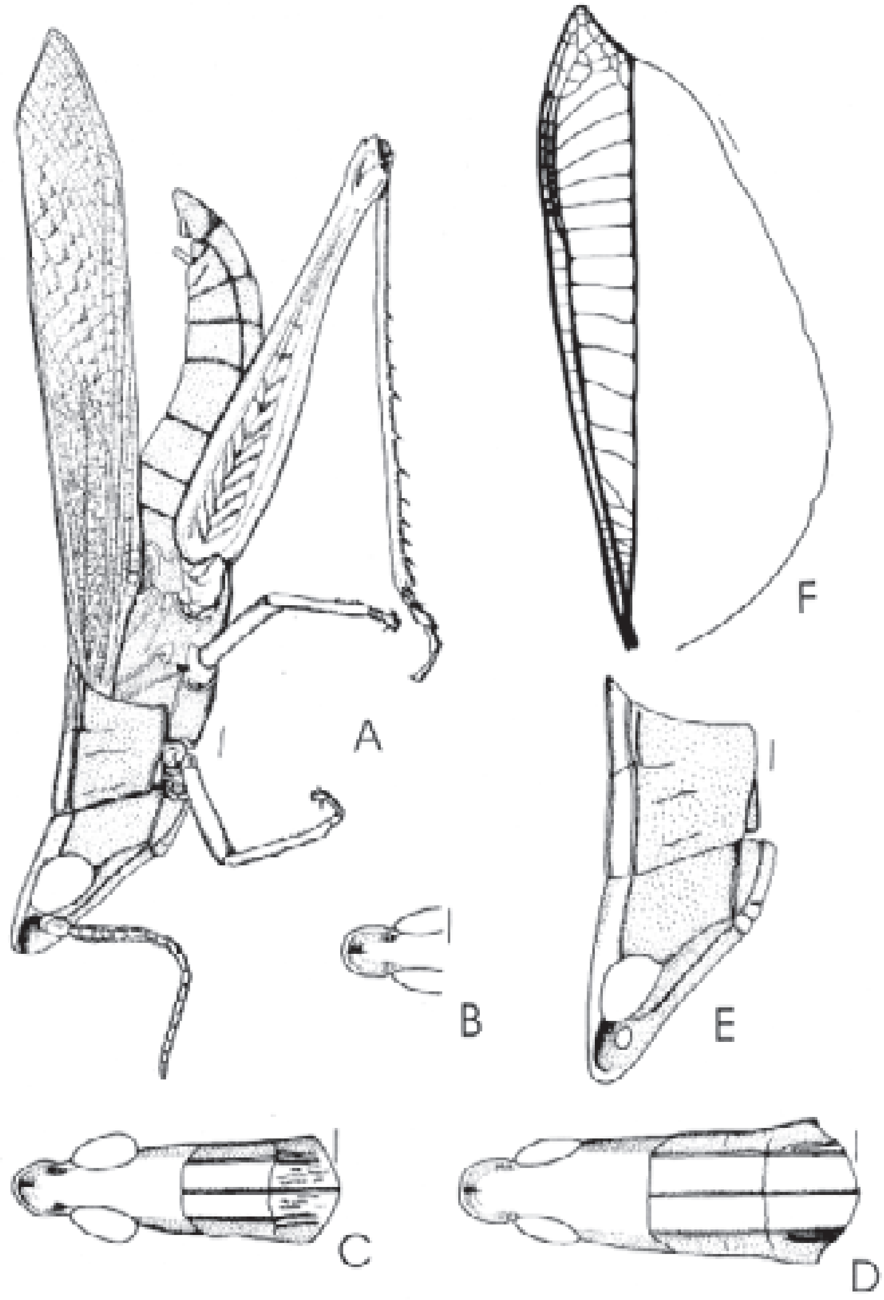


Figure 1. *Allotruxalis gracilis* (Giglio- Tos). A, male, lateral view; B, head and pronotum, dorsal view; C, fastigium rounded, dorsal view; D- E, female, head and pronotum, dorsal and lateral view; F, hind wing of male. Scale line 1 mm.

the type species of *Eutryxalis*, and thus leaving *Eutryxalis* and *Allotruxalis* with the same type species. So, he (Jago 1971) synonimized *Allotruxalis* under *Eutryxalis*. Here Rehn' s (1944) opinion is followed and thus *Allotruxalis* is considered as the valid name for the genus.

SYSTEMATICS

Re- description.- Male: Body compressed with opaque tegument, medium sized insects (from about 21 mm in smallest males to 32 mm in largest females). Head with fastigium elongated, shallowly excavated dorsally, apex subconical or rounded; lateral foveolae absent. Eyes little prominent. Antennae subensiform, the width of scape less than two times the width of first segment of flagellum. Pronotum smooth or with carinulae parallel or subparallel to median longitudinal carina, sides of pronotum in prozona parallel, little divergent in metazona; pronotal disk sub- rectangular, with median carina elevated and cut by principal sulcus, lateral carinae distinct, parallel and single in prozona and double and little divergent in metazona, cut by principal sulcus; anterior margin of pronotum straight, posterior margin of pronotum slightly angulate. Abdomen, male subgenital plate conical pointed at the end. Hind femora elongated; hind knees with pointed upper and lower lobes. Hind wings with 11 to 13 large rectangular- shaped cells between $M+Cu_1$ and Cu_2 veins; end of fore wings obliquely truncated and with distal extremity pointed. Phallic complex: as shown in Figs. 2 A- D. Endophallic plates with anterior expansions well developed; aedeagal valves straight and robust, arch of dorsal valves robust and rounded at the apex; sheath of pennis slightly expanded laterally and denticulate. Cingulum with apodemes wide; ectophallic membrane with lateral sclerite well sclerotized. Epiphallus fenestrated, anterior projections of lateral plates globe- shaped, posterior projections acute and expanded laterally; anchorae constituting independent sclerites, curved inwards, with acute apices; lophi trilobated.

Female: similar to male but larger and more robust. Ovipositor valves short and curve. Internal genitalia: spermathecae (Fig. 2 H) provided with both apical and preapical diverticula. The apical diverticulum rounded at the apex. The pre- apical diverticulum longer than the apical diverticulum.

Distribution.- This genus occurs in south and east Bolivia, south of Brazil, Uruguay and north and central Argentina up to parallel 42° S (Fig. 3).

Remarks.- Rehn (1944) mentioned Río Colorado in Río Negro province of Argentina as southern limit for the distribution of *Allotruxalis*. In this paper, on the basis of new materials collected, I extend the area of distribution of *Allotruxalis* to Somuncurá Plateau, located south and southeast of Río Negro Valley, between 41°- 45° S and 66°- 68° W. This plateau has a total surface of 15000 Km^2 and its greater elevation is 2000 m. Its origin is posterior to the retraction of the Oligocene sea and did not suffer the patagonian glaciations. Therefore, from a paleogeographical and biogeographical point of view, this region has acted as a refuge for certain life-forms (Ringuelet 1975). In this plateau there is an important fauna that Ringuelet (1961) designed as " Brasilic lineage". By way of illustration, endemic animal taxa such as *Pennaphlebia exigua* Dominguez & Pecador (Leptophlebiidae: Ephemeroptera) (Dominguez & Pecador 1983); *Phymaturus somuncurensis* Cei & Castro (Tropiduridae: Sauria) (Cei & Castro 1973); *Somuncuria somuncurensis* (Cei, 1969) (Leptodactylidae: Amphibia) (Cei 1969, 1987); and *Gymnocharacinus bergi* Steindachner (Characidae: Osteichthyes) (Menni & Gómez 1995) may be mentioned. In addition, this locality is the southern distributional limit for some species and subspecies, e.g. *Ischnura fluviatilis* Coenagrionidae: Odonata), *Dasythemis mincki clara* Ris (Libellulidae: Odonata), *Progomphus joergenseni* Ris (Gomphidae: Odonata) (Muzon 1997). Ringuelet (1961) recognized a Guayano-Brasilic fauna whose former distribution extended southward into Patagonia and which suffered a retraction to its actual position during the Neopliocene climatic changes. This event could explain the brasilic lineage that occurs in Somuncura Plateau.

Generic relationships.- The genus *Allotruxalis* lacks the lateral foveola, the forewings of both sexes are obliquely truncated at the apex, the hind wings of males always have enlarged cells between M+Cu$_1$ and Cu$_2$ veins, and the lophi of epiphallus are trilobated, so I agree with Carbonell (1998), Donato (2001) and Otte (1995) in placing this genus in the tribe Hyalopterygini. In a previous paper (Donato & Cigliano 2000) *Allotruxalis* was considered related to *Metaleptea*. After a cladistic analysis of the tribe Hyalopterygini (Donato 2001), these two genera are also closely related to *Eutryxalis* and share the following characters: antennae subensiform, length of fastigium less than the maximum diameter of eye, maximum width of tegmina less than the maximum length of pronotum, and hind wing elongated. These genera differ in the characters listed in table 1.

Allotruxalis gracilis (Giglio- Tos, 1897)

> *Hyalopteryx gracilis* Giglio- Tos, 1897: 22 [Holotype male, San Lorenzo, Bolivia, MRSN].
> *Eutryxalis minor*: Bruner, 1900: 24; Rehn, 1906: 15 (syn. of *Hyalopteryx gracilis* Giglio-Tos).
> *Eutryxalis strigata* Bruner, 1900: 24 [Holotype female, Carcaraña, Santa Fe, Argentina, UNSM]; Rehn, 1906: 15; Kirby, 1910: 106; Liebermann, 1939: 148. **New synonym**.
> *Eutryxalis gracilis*: Rehn, 1906: 15; Kirby, 1910: 106; Rehn, 1913: 313; Hebard, 1931: 270; Liebermann, 1939: 148; 1940: 156; 1941: 27; 1943: 22; Hepper, 1945: 281.
> *Allotruxalis gracilis*: Rehn, 1944: 200; Liebermann, 1954: 13; Otte, 1995: 249; Otte & Naskrecki, 1997: Orthoptera Species File On Line; Carbonell, 1998: 86.
> *Allotruxalis strigata*: Rehn, 1944: 203; Liebermann & Ruffinelli, 1946: 10; Liebermann, 1948: 113; 1951: 46; 1967: 8; Gangwere & Ronderos, 1975: 179; COPR, 1982: 397; Otte, 1995: 249; Otte & Naskrecki, 1997: Orthoptera Species File On Line; Carbonell, 1998: 86; Cigliano *et al*., 2000: 84. **New synonym**.

Systematics. Re- description.- Male: lophi of epiphallus trilobated with median lobe less sclerotized than external and internal lobes (Fig. 2 E- F), the external lobe larger than the internal lobe; bridge narrow and concave, sub- circular.
Female: female subgenital plate with posterior margin rounded and with a slightly concavity behind egg guide (Fig. 2 G).

Coloration.- Male: face, dorsal surface of head, disk of pronotum and disk of tegmina green. Sides of head and lateral lobes of pronotum brown; sides of tegmina brown. Hind wings with anal field usually reddish or colorless**.** Abdomen, hind femora and ventral surface of body brown; some specimens with hind femora greenish. In this pattern of coloration some specimens presents a thin dark brown post- ocular stripe extending on to the lateral lobe of pronotum and up to the anterior portion of tegmina, along the A$_1$ vein. However, some specimens shows other patterns of coloration: homogeneously brown with fine stripes in the dorsal surface of head and pronotum, this pattern of

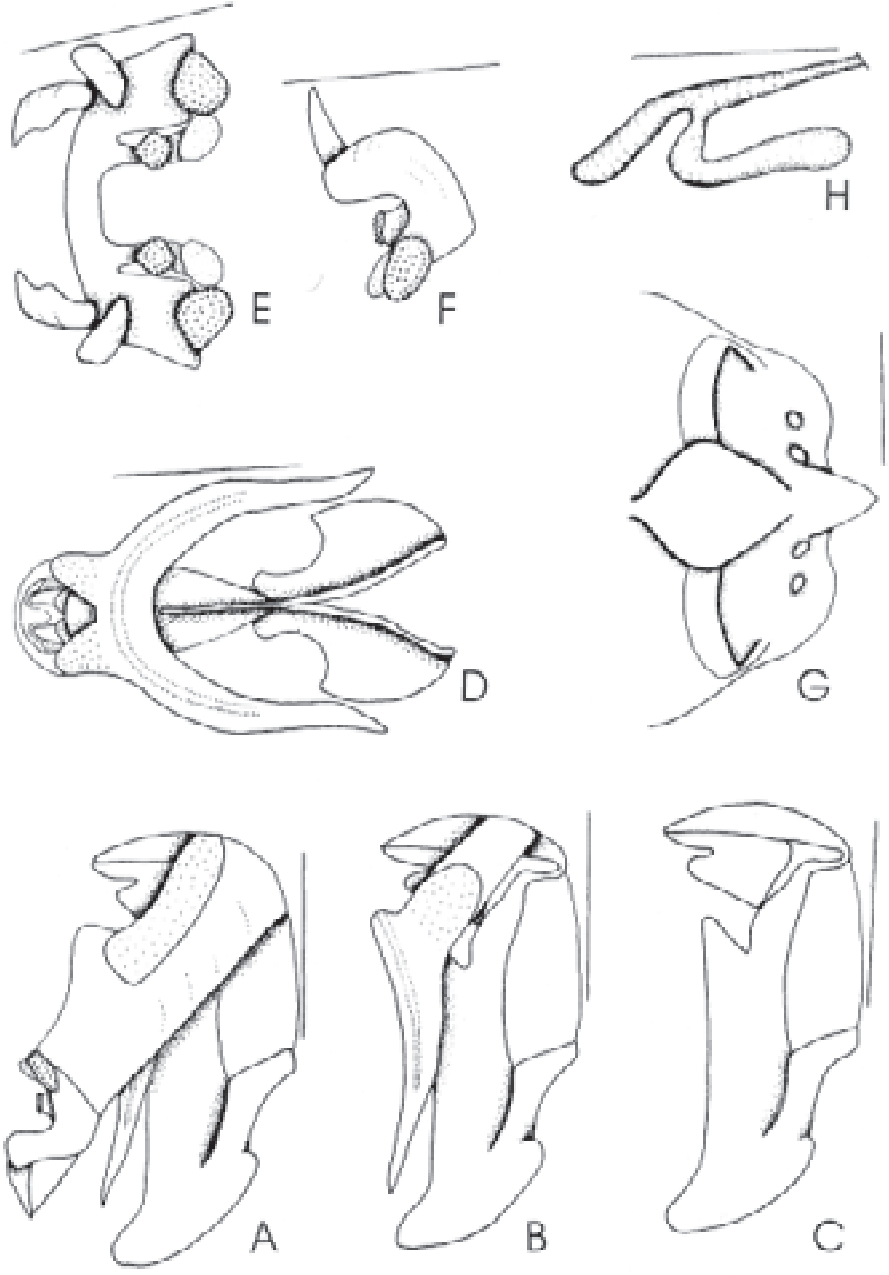


Figure 2. *Allotruxalis gracilis* (Giglio- Tos). Phallic complex: A, whole complex, lateral view; B, whole complex without epiphallus and lateral plates, lateral view; C- D endophallus and arch, dorsal and lateral view; E- F, epiphallus, dorsal and lateral view; G, female, female subgenital plate, dorsal view; H, spermatheca. Scale line 1 mm.

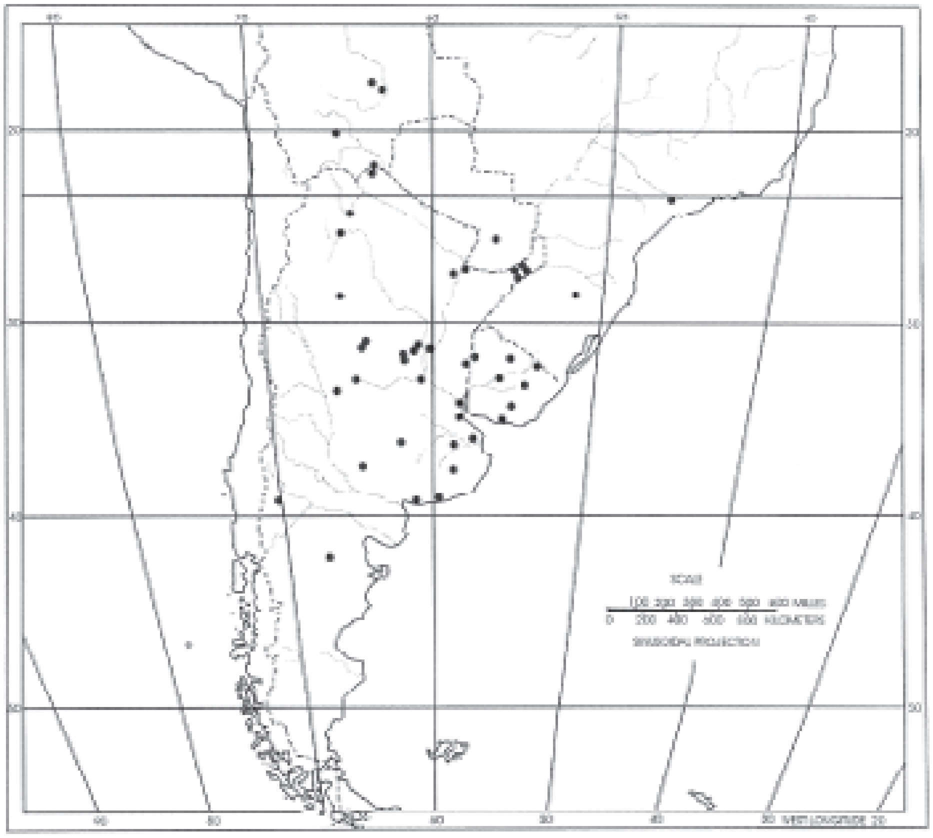


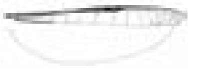
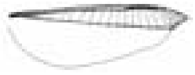
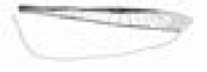
Figure 3. Known geographic distribution of *Allotruxalis gracilis* (Giglio- Tos).

coloration sometimes present in the sides of head and pronotum; or face, dorsal surface of head, disk of pronotum and disk of tegmina brown, sides of head and lateral lobes of pronotum brown, sides of tegmina green.

Female: Variable in color; some are homogeneously green or brown and often with a brown post- ocular stripe extending on the anterior portion of tegmina, where it turns into dark brown spots; dorsal surface of body brown. Some specimens with face, dorsal surface of head, disk of pronotum and disk of tegmina brown, sides of head and lateral lobes of pronotum green, sides of tegmina brown. Some specimens with a red wine color on face, dorsal surface of head, disk of pronotum and disk and sides of tegmina, sides of head and lateral lobes of pronotum brown. The female specimen of *E. strigata*’s type species presents a brownish coloration with numerous dark brown stripes in head, pronotum and abdomen, and in tegmina a thin dark brown stripe at each side of each nervature.

Material examined.- ARGENTINA, Corrientes, San Cosme, one female, mar 1938, *H. Wärth*, MACN; Córdoba, Dto Calamuchita, “El Sauce”, three males, una female, dec 1938, *M. J. Viana*, MACN; Buenos Aires, Las Flores, five males, jan 1938, *J. B. Daguerre*, MACN; Misiones, Dto Concepción, Santa

Table 1. Comparison of *Allotruxalis* and *Eutryxalis* with its closest genus.

	Body shape	Apex of fastigium	Face [1]	Lateral carinae cut by principal sulcus only	Hindwing	Color of hindwing
Eutryxalis	Robust	Subconical or rounded	Less retreated	No		Pale
Allotruxalis	Slender	Rounded	Retreated	Yes		Pale- red
Metaleptea	Robust	Subconical	Less retreated	No		Pale- green

(1) This character is taken considering the angle formed between two imaginary planes: one in the dorsal surface of head and the other in the face in lateral view. Less retreated: 39° to 46°, retreated: 33° to 35°.

María, three females, *M. J. Viana*, MACN; San Luis, El Volcán, four females, feb 1942, *H. Hepper*, MACN; Córdoba, Dto. Punilla, Valle Hermoso, one female, dec 1942, *M. J. Viana*, MACN; Córdoba, one male, apr 1974, MACN; Santa Fe, Carcarañá, three males, one female, 21 feb 1965, *C. S. Carbonell, A. Mesa & M. Monné*, FHCM; Misiones, Cerro Corá, one female, 19 mar 1965, *C. S. Carbonell, A. Mesa & M. Monné*, FHCM; Chaco, Resistencia, one female, 26 feb 1965, *C. S. Carbonell, A. Mesa & M. Monné*, FHCM; Salta, Aguaray, one male, 1 feb 1965, *A. Mesa & R. Sandulski, FHCM*; ARGENTINA, Santa Fe, Jobson, one male, 24 feb 1965, *C. S. Carbonell, A. Mesa & M. Monné*, FHCM; La Rioja, two males, three females, *Dr. Marelli*, MLP; ARGENTINA, Buenos Aires, 30 Km before Trenque Lauquen, two males, 24 feb 1994, *C. Lange*, MLP; Catamarca, 15 Km S San Fernando del Valle de Catamarca, two males, one nymph, 10 dec 1997, *M. M. Cigliano & C. Lange*, MLP; Córdoba, Quebracho Herrado, one male, one female, 3 nov 1998, *M. Donato*, MLP; Misiones, one male, *P. Jorgensen*, MLP; Santa Fe, Rafaela, Ruta Nacional 34, Km 227, one female, 21 apr 1997, *S. Hoffmann*, MLP; Santa Fe, Rafaela, Ruta Nacional 34, Km 227, one female, 21 apr 1997, *I. Bertolaccini*, MLP; Santa Fe, Rafaela, Ruta Nacional 34, Km 227, one male, 8 sep 1997, *I. Bertolaccini*, MLP; Salta, Coronel Moldes, one male, 1/ 3 feb 1960, *Ajmat & Bennasas*, MLP; Río Negro, Meseta del Somuncurá, El Rincón, one male, one female, 28 jan 1999, *J. Muzón*, MLP; Santa Fe, Las Petacas, one male, one female, 15 dec 1998, *M. Donato*, MLP; La Pampa, between General Acha and Quehuén, MLP; Buenos Aires, Monte Hermoso, one male, 22 feb 1989, *M. M. Cigliano*, MLP; Santa Fe, Dto Carrasco, Rafaela, one male, 14/ 17 dec 1998, *M. Donato*, MLP; Entre Ríos, P. N. “El Palmar”, one female, 26 sep 1997, *M. Donato*, MLP; idem, one male, sep 1998 (MLP); Misiones, Loreto, one male, *A. A. Ogloblin*, MLP; Capital Federal, Saavedra, one female, 1935, *S. R. Castillo*, MLP; Neuquén, Covunco Centro, one male, mar 1941, *Maldonado*, MLP; Buenos Aires, Laguna Adela, one female, *C. Cesar*, MLP; Córdoba, Dto Punilla, La Cumbre, one female, 6 feb 1950, MLP; Buenos Aires, Claromecó, two females, 1 mar 1957, *B. Torres & R. A. Ronderos*, MLP; Buenos Aires, Tandil, Cerro Las Armas, one female, 30 jan 1958, *R. A. Ronderos*, MLP; Córdoba, one male, 19 dec 1967, *C. S. Carbonell, R. A. Ronderos & A. Mesa*, MLP;

Santa Fe, Dto Carrasco, INTA Rafaela, one female, 14 dec 1998, *M. Donato*, MLP; Formosa, Las Lomitas, three males, one female, 13 apr 1999, *M. M. Cigliano & C. Lange*, MLP; idem, two males, one female, 19 oct 1998, MLP; La Pampa, General Acha, three males, two females, 15may 1991, *C. Lange*, MLP; Misiones, Oberá, 3 Km W Guaraní, one female, 3 apr 1999, *C. Fasano*, MLP; Jujuy, San Juancito, one male, one female, 27 feb 1920, *Cornell Univ. Exp.*, ANSP; Misiones, one male, one female, *P. Jorgensen*, ANSP; idem, one female, 14 dec 1910, ANSP; Santa Fe, Laguna Paiva, one male, 21/ 23 feb 1920, *Cornell Univ. Exp.*, ANSP; Santa Fe, Carcarañá, four females, ANSP; Buenos Aires, two females, 20 feb 1909, *P. Jorgensen*, ANSP. BOLIVIA, Santa Cruz, one female, mar 1962, *I. Apostol*, MACN; Santa Cruz, one male, sep 1917, *Lizer & Deletang*, MLP; Lagunillas, one male, nov 1917, *Lizer & Deletang*, MLP; Dto Tarija, Yacuiba, one female, 24 jan 1999, *M. Donato*, MLP; Provincia del Sara, 450 m, seven females, *J. Steinbach*, ANSP; idem, one male, dec 1912, ANSP; Provincia del Sara, 350 m, one female, *J. Steinbach*, ANSP; Santa Cruz, two males, one female, sep 1917, ANSP; Buena Vista, *J. Steinbach*, ANSP. BRAZIL, Sao Paulo, Indaiatuba, two females, 22 feb 1961, *A. Mesa*, FHCM; Rio Grande do Sul, Passo Fundo, two males, three females, 8 jan 1920, *Cornell Univ. Exp.*, ANSP. PARAGUAY, Paraguarí, Sapucay, one female, 7 mar 1965, *A. Mesa, C. S. Carbonell & M. Monné*, FHCM; Sapucay, one female, 3 feb 1905, *Foster*, ANSP; idem, three males, 10 feb 1905, ANSP; idem, one male, one female, 13 feb 1905, ANSP; idem, one male, three females, 15 feb 1905, ANSP; idem, three females, 2 mar 1905, ANSP; idem, one male, 6 mar 1905, ANSP; idem, one female, 10 mar 1905, ANSP. URUGUAY, Tacuarembó, Tacuarembó Chico, one female, 25 jan 1960, *C. S. Carbonell*, FHCM; Tacuarembó, Puntas Arroyo Laureles, Vassoura, one female, 2 mar 1960, *C. S. Carbonell*, FHCM; Florida, Casupá, one female, 8 mar 1955, *C. S. Carbonell*, FHCM; Sierra de Aceguá, Cerro Largo, one male, one female, 20 nov 1954, *A. Mesa & C. S. Carbonell*, FHCM; Tacuarembó, Chamberlain, two males, 22 mar 1963, *A. Mesa & C. S. Carbonell*, FHCM; Treinta y Tres, Santa Clara de Olimar, one male, 2 feb 1960, *C. C. de Zolessi*, FHCM; Paysandú, Estación Chapicuy, one male, 27 apr 1963, *A. Mesa & C. S. Carbonell*, FHCM; Montevideo, Malvín, 16 nov 1963, *P. Achaval*, FHCM.

Eutryxalis Bruner, 1900
(Figs. 4 A- G, 5 A- H, 6)

Type species: *Metaleptea minor* Giglio- Tos, 1897 by subsequent designation (Art. 69.1, ICZN 2000).

> *Eutryxalis* Bruner, 1900: 22 (without type species designation); Bruner, 1906: 625; Rehn, 1906: 15 (type species: *Hyalopteryx gracilis* Giglio- Tos, 1897); Rehn, 1944: 206 (type species: *Metaleptea minor* Giglio- Tos, 1897); Jago, 1971: 213 (discussion of type species); Amedegnato, 1974: 202; Otte, 1995: 278 (considered the genus as uncertain tribe); Otte & Naskrecki, 1997: Orthoptera Species File On Line; Carbonell, 1998: 86.
> *Paratruxalis* Rehn, 1916: 32 (type species: *Chrysochraon filatus* Walker, 1870); Liebermann, 1939: 149; Hepper, 1945: 282.

Types examined.- Of *Metaleptea minor*, a male in MRSN labeled Holotype, San Lorenzo, without other data, this locality occurs in Bolivia. Of *Eutryxalis filata bellula*, two males in ANSP labeled each one: paratype, Barinas, Estado de Barinas, Venezuela, jan 1943, P. Anduze; and one male in ANSP labelled: paratype, Galipan, Distrito Federal, Venezuela, 30 apr 1939, G. V. Berthier.

TAXONOMY

Rehn (1916) proposed the name *Paratruxalis* for *Chrysochraon filatus* Walker, 1870. Later, Rehn (1944) listed *Paratruxalis* as a synonym of *Eutryxalis* based on the following considerations: 1) the name *Eutryxalis* was already fixed to *Metaleptea minor* Giglio- Tos (Rehn 1906) as already explained here under the *Allotruxalis* heading, and 2) he had previously considered (Rehn 1916) *Metaleptea minor* Giglio- Tos a subspecies of *Paratruxalis filatus*.

Systematics. Re- description.- Male: Body compressed with opaque tegument, medium sized insects (from about 19 mm in smallest males to 25 mm in largest females). Head with fastigium elongated, shallowly excavated dorsally, apex subconical or rounded; lateral foveolae absent. Eyes little to moderate prominent. Antennae subensiform, the width of scape less than two times the width of first segment of flagellum. Pronotum, sides of pronotum in prozona parallel, little divergent in metazona; pronotal disk sub- rectangular, with median carina cut by principal sulcus, lateral carinae distinct, parallel and single in prozona and single or double and little divergent in metazona, cut by principal and secondary sulcus; anterior margin of pronotum straight, posterior margin of pronotum slightly angulate. Abdomen, male subgenital plate conical pointed at the end. Hind femora elongated; hind knees with pointed upper and lower lobes. Hind wings with 6 to 7 large rectangular- shaped cells between M+Cu$_1$ and Cu $_2$ veins; end of fore wings obliquely truncated. Phallic complex: as shown in Fig. A- H. Endophallic plates with anterior expansions well developed; aedeagal valves straight and robust, arch of dorsal valves robust and rounded at the apex; sheath of pennis slightly expanded laterally and denticulate. Cingulum with apodemes wide; ectophallic membrane with lateral sclerite well sclerotized. Epiphallus fenestrated, anterior projections of lateral plates globe- shaped, posterior projections rounded and slightly expanded laterally; anchorae constituting independent sclerites, curved inwards, with acute apices; lophi trilobated.
Female: similar to male but larger and more robust. Ovipositor valves short and curve. Internal genitalia: spermathecae provided with both apical and preapical diverticula. The apical diverticulum rounded at the apex. The pre- apical diverticulum longer than the apical diverticulum.

Distribution.- This genus occurs in Sierra Nevada of Santa Marta and the north of Cordillera Oriental in Colombia; the Andes in Venezuela; east of Bolivia and Peru; northeast, central and south of Brazil, Paraguay and Jujuy, Chaco, Formosa and Misiones provinces of Argentina (Fig. 6).

Generic relationships.- The genus *Eutryxalis* are closely related to *Allotruxalis* and *Metaleptea* as was explained above (see also table 1 for generic differences). It is important to point out that Carbonell (1998) and Donato (2001) included *Eutryxalis* within Hyalopterygini but Otte (1995) and Otte & Naskrecki (1997) placed the genus in the category “uncertain tribe”.

Eutryxalis filata (Walker, 1870)

Chrysochraon filatus Walker, 1870: 785.
Metaleptea minor Giglio- Tos, 1897: 22.
Eutryxalis minor: Bruner, 1900: 24; Bruner, 1906: 625.
Orphula minor: Rehn, 1906: 16.
Orphula pagana minor: Rehn, 1913: 314.
Paratruxalis filatus: Rehn, 1916: 276; Hebard, 1923: 197; 1931: 270; Liebermann, 1939: 149; 1941: 28; Hepper, 1945: 282.
Paratruxalis filatus minor: Rehn, 1916: 276.

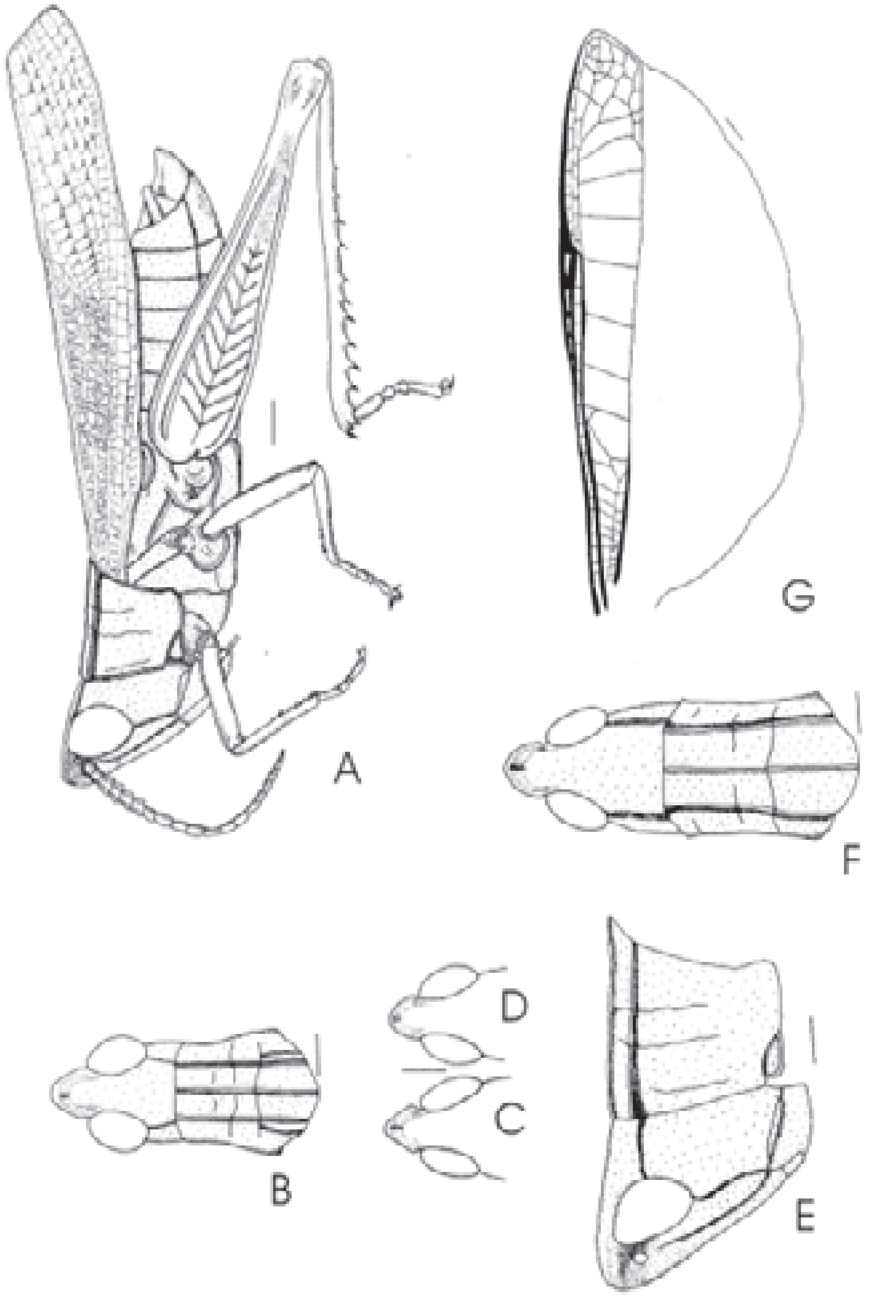


Figure 4. *Eutryxalis filata* (Walker). A, male, lateral view; B, head and pronotum, dorsal view; C- D, fastigium dorsal view, subconical and rounded,; E- F, female, head and pronotum, dorsal and lateral view; G, hind wing of male. Scale line 1 mm.

Eutryxalis filata: Rehn, 1944: 208; Liebermann, 1950: 139; 1951: 48.
Eutryxalis filata filata: Rehn, 1944: 209; Liebermann, 1948: 112; 1950: 135; Otte, 1995: 278; Otte & Naskrecki, 1997: Orthoptera Species File On Line; Carbonell, 1998: 87. **New synonym.**
Eutryxalis filata minor: Rehn, 1944: 213; Otte, 1995: 278; Otte & Naskrecki, 1997: Orthoptera Species File On Line; Carbonell, 1998: 87. **New synonym.**
Eutryxalis filata bellula Rehn, 1944: 217; Otte, 1995: 278; Otte & Naskrecki, 1997: Orthoptera Species File On Line; Carbonell, 1998: 87. **New synonym.**

Systematics. Re- description.- Male: male subgenital plate short; epiphallus with external lobe of lophi big, sub. rectangular and its posterior extremidad acute and curved inwards, intrenal and median lobes rounded and approximately the same size, smaller than the external lobe.
Female: female subgenital plate with posterior margin rounded and with a slightly concavity next to egg guide; spermatheca provided with both apical and preapical diverticula. The apical diverticulum rounded at the apex and enlarged. The pre- apical diverticulum longer than the apical diverticulum.

Coloration.- There is no difference in coloration between male and female. General pattern brownish, some specimens with a darker coloration. It can present a dark brown post- ocular stripe extending on to the lateral lobe of pronotum and up to the anterior portion of tegmina. Some specimens with fine stripes beside the median line in the dorsal surface of head. Hind wings with anal field pale or slightly brownish.

Material examined.- ARGENTINA, Misiones, Ruta nacional 12, Km 1628, 29 males, five females,16 mar 1999, *M. M. Cigliano & C. Lange*, MLP; Misiones, 27° 38' S- 55° 06' W, seven males, one female, 2 apr 2000, *M. Donato*, MLP; Misiones, Ruta provincial 2, 27° 55' S- 55° 27' W, one male, 2 apr 2000, *M. Donato*, MLP; Misiones, A° Aracagüé, Balneario "El Bonito", 27° 27' S- 55° 54' W, four males, four females, 3 apr 2000, *M. Donato*, MLP; Salta, Río Las Piedras, one male, 22 mar 1969, *R. A. Ronderos*, MLP; Misiones, Iguazu Falls, one male, 20/22 jan 1920, *Cornell Univ. Exp.*, ANSP; Misiones, one male, two females, 6 may 1910, *P. Jorgensen*, ANSP; idem, one male, one female, 12 dec 1910, ANSP; idem, one female, 30 apr 1910, ANSP; Province of Jujuy, Jujuy, one male, apr 1911, *P. Jorgensen*, ANSP; Misiones, Bernardo de Irigoyen, five males, one female, 16 mar 1965, *C. S. Carbonell*, *A. Mesa*, *M. A. Monné*, FHCM; Salta, Aguaray, one male, 1 feb 1965, *A. Mesa & R. Sandulski*, FHCM; Salta, Tartagal, two females, 29/31 jan 1965, *A. Mesa & R. Sandulski*, FHCM. BOLIVIA, Provincia de Sara, Depto. Santa Cruz, one male, one female, ANSP; idem, one female, 5/20 nov1922, *J. Steinbach*, ANSP; idem, one male, 1922, *J. Steinbach*, ANSP; Trinidad, one female, oct 1917, ANSP; Yungas, one male, one female, ANSP; Depto. Santa Cruz, Buenavista, one female, 3 nov 1922, *J. Steinbach*, ANSP; Santa Cruz de la Sierra, three males, one female, 20/28 feb 1922, *J. Steinbach*, ANSP; Cuatro Ojos, one female, sep 1917, ANSP; idem, one female, *Lizer- Deletang*, ANSP; Caiza, one male, ANSP; Yacuiba, one male, dec 1917, ANSP; Provincia Sara, Depto Santa Cruz, 500 m, one male, one female, *J. Steinbach*, ANSP; idem, one female, 1922, ANSP; Lagunillas, one female, nov 1917, ANSP; Santa Cruz, 1male, sep 1917, FHCM. BRAZIL, San Pablo, 1 female, ANSP; San Pablo, Piracicaba, one male, ANSP; Santa Catharina, Nova Teutonia (Correio Ita), one male, ANSP; Matto Grosso, one male, two females, 6/10 dec 1919, *Cornell Univ. Exp.*, ANSP; Corumbá, Urucum, one male, 22/29 dec 1919, *R. G. Harris*, ANSP; Matto Grosso, Santa Rosa de Descalvados,

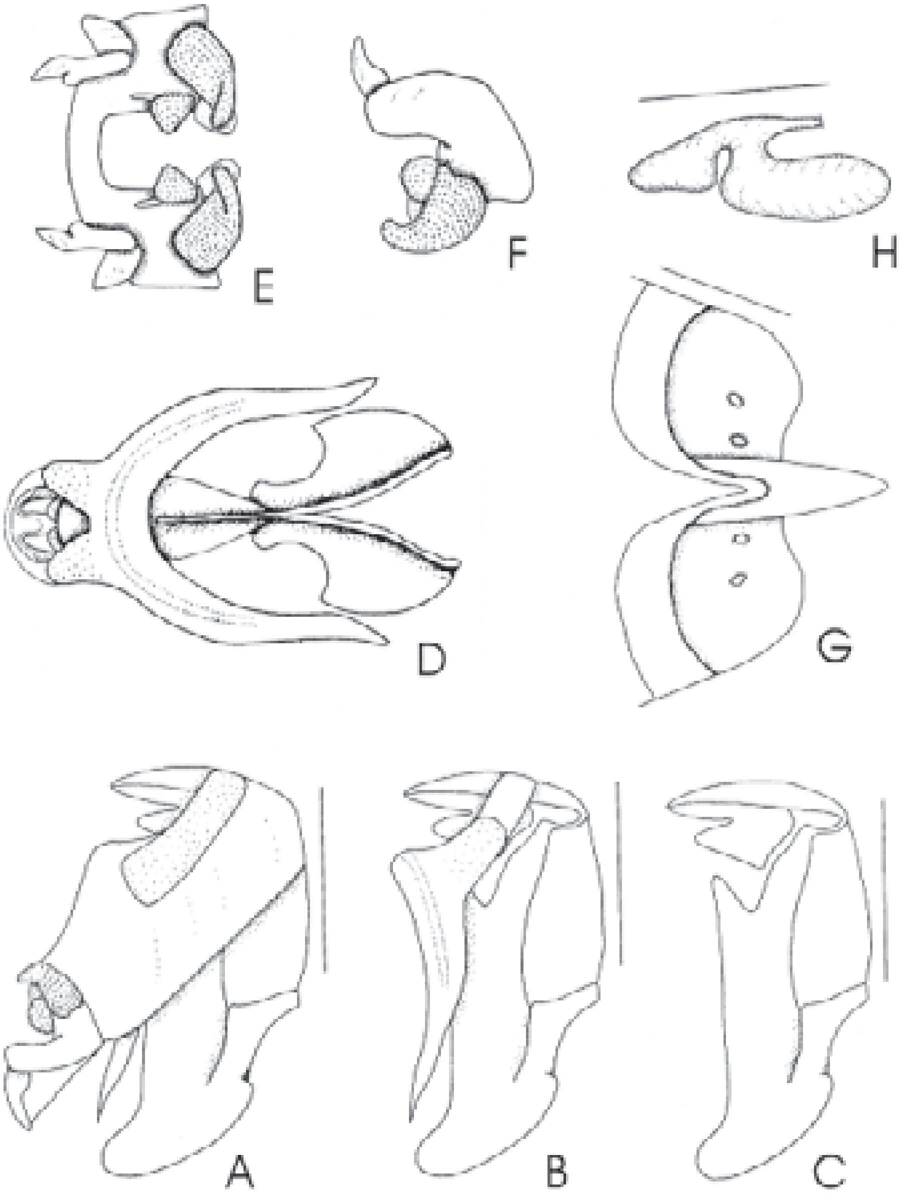
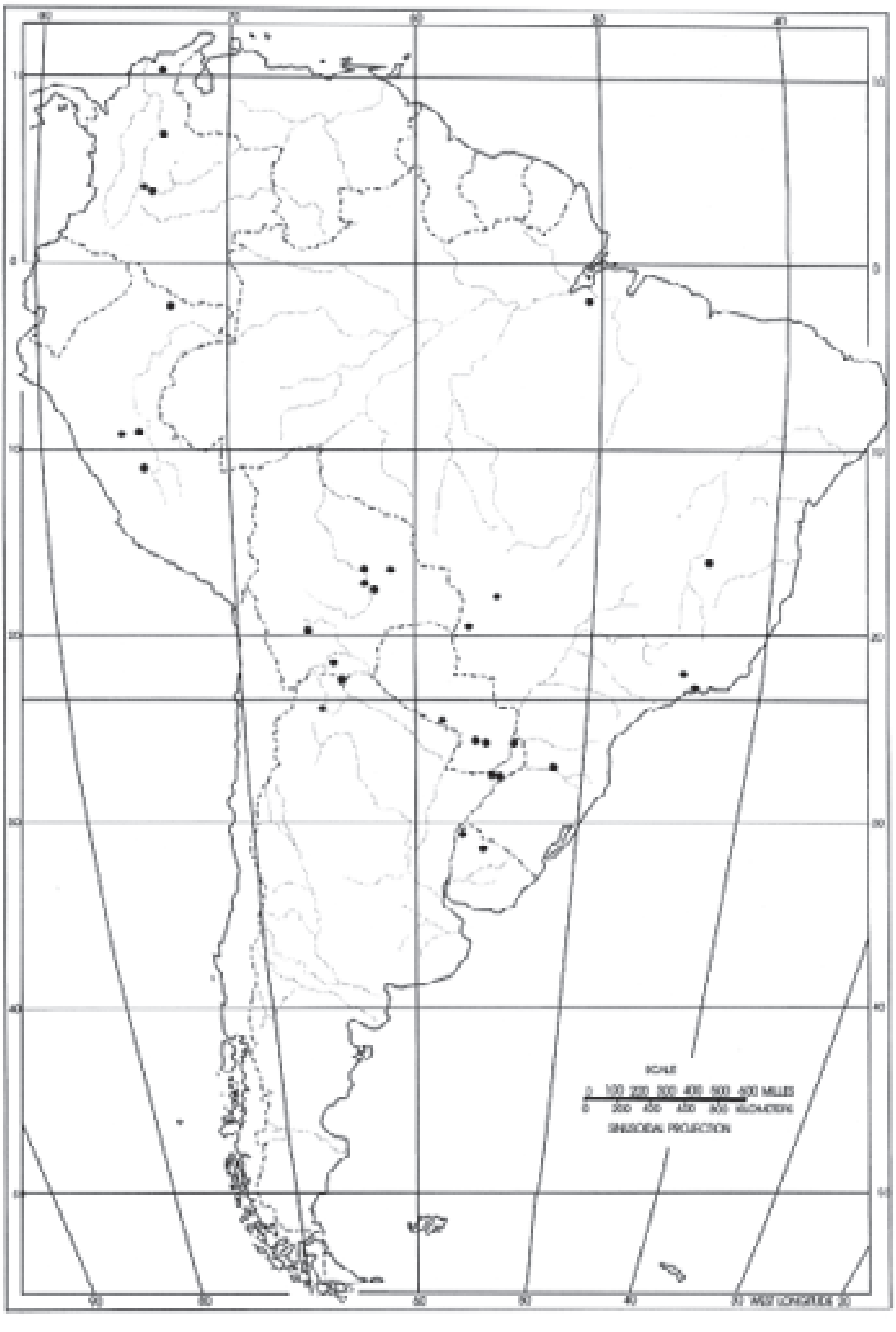


Figure 5. *Eutryxalis filata* (Walker). Phallic complex: A, whole complex, lateral view; B, whole complex without epiphallus and lateral plates, lateral view; C- D endophallus and arch, dorsal and lateral view; E- F, epiphallus, dorsal and lateral view; G, female, female subgenital plate, dorsal view; H, spermatheca. Scale line 1 mm.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0 100 200 300 400 500 600 MILES
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SINUSOIDAL PROJECTION
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Figure 6. Known geographic distribution of *Eutryxalis filata* (Walker).

two females, 31 jul 1931, *J. A. G. Rehn*, ANSP; Chapada, one male, ANSP; Para Para, three males, 12 mar 1924, ANSP; Para, one female, *Baker*, ANSP; Minas Gerais, Lassance, one male, 9/19 nov 1919, ANSP; Río, Pau da Fome, one male, 1 nov 1940, *M. T. Lopes*, ANSP; Rio Grande do Sul, one female, ANSP; Sao Paulo, Indaiatuba, one male, one female, 22 sep1961, *A. Mesa*, FHCM; Pirassununga, one male, 8 may 1962, *E. Bran*, FHCM; Sao Paulo, Piracicaba, one female, 19 oct 1961, *A. Mesa*, FHCM; Sao Paulo, Piracicaba, Volta Grande, three males, two females, 4 may 1962, *A. Mesa*, FHCM; Rio Grande do Sul, Nonoai, three males, five females, 20 feb 1964, *C. S. Carbonell, A. Mesa, M. A. Monné*, FHCM; Rio Grande do Sul, Ruta Pelotas- Puerto Alegre, Km 54, three males, 11 feb 1964, *C. S. Carbonell, A. Mesa, M. A. Monné*, FHCM; Rio Grande do Sul, Trindade, two males, two females, 22 feb 1964, *C. S. Carbonell, A. Mesa, M. A. Monné*, FHCM; Santa Catarina, Campos Novos, Río Ibicui, one female, apr 1988, *Monné- Roppa*, FHCM; Rio Grande do Sul, Ronda Alta, two females, 24 feb 1964, *C. S. Carbonell, A. Mesa, M. A. Monné*, FHCM. COLOMBIA, Villavicencio, one female, 1925, *A. María*, ANSP; idem, one female, 1921, ANSP; Coachí, one female, may 1915, *A. María*, ANSP; Bogotá, one female, 1915, *A. María*, ANSP; Sierra Nevada de Santa Marta, Taquima, 6500 ft., one male, 25 apr 1914, ANSP; Santander, Pueblo Nuevo de Ocana, one female, 3 sep 1916, *M. A. Carriker jr.*, ANSP. PARAGUAY, Horqueta, 45 Km E río one male, dec 1907, *A. Schulze*, ANSP; idem, one female, 19 mar 1905, ANSP; idem, one female, feb 1902, ANSP; Villa Rica, one male, four females, mar 1922, *P. Jorgensen*, ANSP; Punta Cantera, one male, one female, dec 1913, *C. Schrottky*, ANSP; Alto Paraná, one male, mar 1914, ANSP; Sapucay, one male, 13 feb 1905, *Foster*, ANSP; Paraguarí, Paraguarí, four males, three females, 10 mar 1965, *C. S. Carbonell, A. Mesa, M. A. Monné*, FHCM; Alto Paraná, Puerto Pta Franco, two males, one female, 15 mar 1965, *C. S. Carbonell, A. Mesa, M. A. Monné*, FHCM; Paraguarí, Sapucay, four males, three females, 7 mar 1965, *A. Mesa, C. S. Carbonell, M. A. Monné*, FHCM; Ruta Caaguazú- Yhú, 40 km N de Caaguazú, Caaguazú, one male, 13 feb 1965, *C. S. Carbonell, A. Mesa, M. A. Monné*, FHCM; Central Luque, three females, 3 mar 1965, *C. S. Carbonell, A. Mesa, M. A. Monné*, FHCM. PERU, El Campamiento, Col. Perene, 1000 m, one male, 19 apr 1920, *Cornell Univ. Exp.*, ANSP; Chanchamayo, one male, jun 1910, ANSP; idem, one female, dec 1910, ANSP; Depto. Huaraco, Conchamarca, 2000 m, two males, one female, 5 nov 1937, *F. Woytkowsky*, ANSP; La Chorrera to La Sombra, Putumayo, two females, 21 ago 1920, *Cornell Univ. Exp.*, ANSP. URUGUAY, Tacuarembó, Punta Laureles, one male, 11 feb 1950, *C. S. Carbonell*, FHCM; Artigas, A° de la Invernada, two females, 20 feb 1954, *C. S. Carbonell*, FHCM. VENEZUELA, Gran Sabana, Akuriman, one male, oct 1940, *P. Anduze*, ANSP; Sucre, Elvecia near Mt. Turumquire, one female, 18 jan 1930, *G. Netting*, ANSP.

Results of the multivariate analysis in *Eutryxalis*

In the principal component analysis of male specimens, the first two components accounted for 74.48 % of the total variation (57.17 and 17.3 %, respectively). Component I had significant representation for characters length of tegmina (LT), body length (BL) and length of pronotum (LP). The ratio width of head at eyes (WE)/ width of head (WH) showed strong association with the second component. Figure 7 showed that one major group was formed when the first and second component were plotted.

In Figure 7, the specimens of different localities are superimposed. By way of example, a specimen of Rio Grande do Sul that would belong to *E. f. filata* is near a specimen of Bolivia that would belong to *E. f. minor*. It would be expected that specimens of the different localities belonging to the areas of distribution of the three subspecies described by Rehn (1944) would form three separate groups. Internal dispersion of the group is observed mostly along the first component. Specimens showing larger size are mostly plotted on the upper section of the group, and those showing smaller size are plotted on the lower portion. On the other hand, specimens showing larger ratio WE/WH are plotted on the upper section of the group and those showing smaller ratio WE/WH are plotted on the lower portion. This arrangement of the group formed exhibits a continuous intraspecific variation in the characters used by Rehn (1944) and therefore, they do not separate the three subspecies described by him.

DISCUSSION

The characters used by Rehn (1944) to separate the two species of genus *Allotruxalis* are meristic. The examination of specimens deposited in different institutions and material collected in the field has revealed that these characters cannot allow to discriminate the two species. On the other hand, the characters found in male and female genitalia are stable in all of the specimens examined. Therefore, based on these arguments I considered *A. strigata* as a junior synonym of *A. gracilis*.

When the term subspecies came into general usage during the nineteenth century, it replaced the term variety with the meaning of "geographic race" (Mayr & Ashlock 1991). The subspecies may be defined as follows: A subspecies is an aggregate of phenotipically

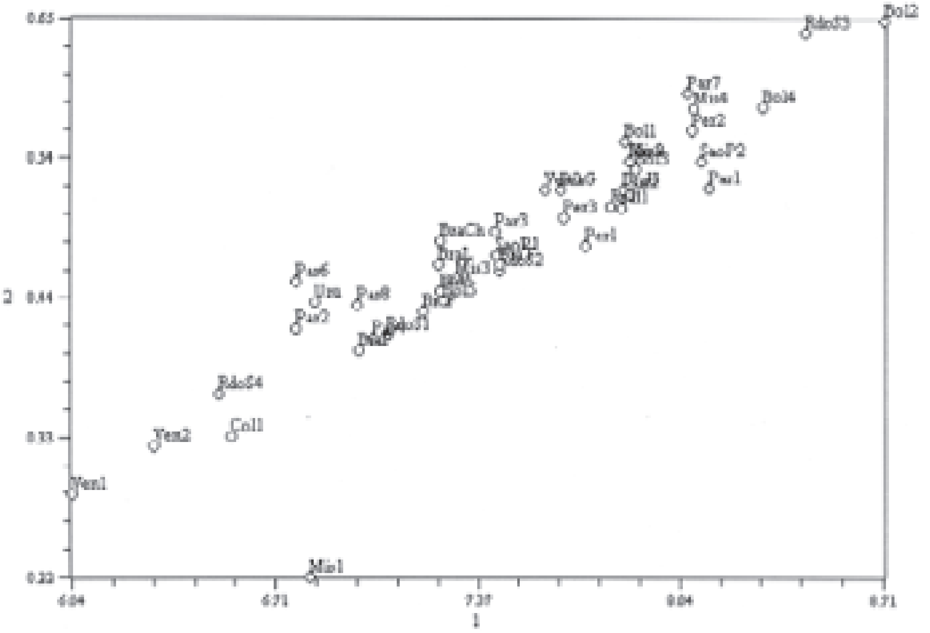

Figure 7. Ordination of male specimens on principal components I and II in *Eutryxalis filata* (Walker). Specimens are identified in Appendix I.

similar populations of a species inhabiting a geographic subdivision of the range of that species (Mayr & Ashlock 1991). The variation found within an entity must have precise geographic limits to separate at subspecies range (Cracraft 1989). In the case of *Eutryxalis filata*, the multivariate analysis (Fig. 7) shows that there are no differences between the three subspecies described by Rehn (1944). The characters used by him to separate these entities are overlapping; thus none of the three subspecies possesses any singularity and neither do they maintain precise geographic limits that would justify the subspecies range. Therefore I consider *Eutryxalis filata filata*, *Eutryxalis filata minor* and *Eutryxalis filata bellula* as junior synonyms of *Eutryxalis filata*.

ACKNOWLEDGEMENTS

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Appendix 1.- Character- states matrix for males in the revision of *Eutryxalis* Bruner. Measurements are in millimeters.

Subspecies	Locality	Acronym	BL	LF	WF	Rel. WE/WH	LP	LT
E. f. filata	Argentina, Misiones, 27° 38´- 55° 12´	Mis1	18	0.8	0.98	1.47	2.7	13
E. f. filata	Argentina, Misiones, ruta 12 Km 1618	Mis2	21	0.75	0.9	1.06	3	15
E. f. minor	Argentina, Salta, Río Las Piedras	Sal1	22	0.75	0.87	1.1	2.85	14
E. f. filata	Brazil, San Pablo, Pirasununga	SaoP1	20	0.72	0.81	1.12	2.88	14
E. f. filata	Paraguay, Alto Paraná	Par1	22	0.84	1.05	1.1	3.15	15
E. f. filata	Argentina, Misiones, Bemardo de Irigoyen	Mis3	19	0.75	0.93	1.08	3.09	14
E. f. filata	Brazil, Rio Grande do Sul, Nonoai	RdoS1	19	0.75	0.84	1.11	3	13
E. f. filata	Brazil, Rio Grande do Sul, Piracicaba	RdoS2	20	0.75	0.9	1.11	2.85	14
E. f. filata	Uruguay, Tacuarembó, A° Laureles	Uru	18	0.6	0.9	1	2.85	13
E. f. filata	Brazil, San Pablo, Indaiatuba	SaoP2	22	0.81	0.9	1.11	3.15	15
E. f. bellula	Venezuela, Galipan	Ven1	16	0.9	0.72	1.02	2.73	11
E. f. bellula	Venezuela, Barinas	Ven2	17	0.66	0.75	1.12	2.28	12
E. f. bellula	Venezuela, Akuriman	Ven3	20	0.75	0.81	1.07	2.7	15
E. f. minor	Argentina, Salta, Aguaray	Sal2	21	0.9	0.81	1.11	3	15
E. f. filata	Paraguay, Cord. Hacurubí	Par2	18	0.6	0.81	1.07	2.64	13
E. f. filata	Paraguay, Paraguarí, Sapucay	Par3	20	0.72	0.81	1.07	2.85	14
E. f. filata	Paarguay, Caaguazú	Par4	19	0.75	0.9	1.07	2.7	13
E. f. filata	Paraguay, Paraguarí, Paraguari	Par5	21	0.75	0.9	1.06	3	15
E. f. filata	Brazil, Rio Grande do Sul, Trindade	RdoS3	22	0.78	0.87	1.07	3	17
E. f. filata	Brazil, Rio Grande do Sul, ruta Pelotas	RdoS4	17	0.6	0.75	1.16	2.46	13
E. f. minor	Bolivia, Santa Cruz	Bol1	21	0.75	0.81	1.05	3	15
E. f. minor	Peru, La Chorrera	Per1	21	0.93	1.02	1.02	3	14
E. f. bellula	Colombia, Taquima	Col1	18	0.66	0.81	1.15	2.49	12
E. f. minor	Bolivia, Lagunillas	Bol2	23	0.84	0.96	1.06	3.15	17
E. f. filata	Brazil, Pará	BraP	19	0.66	0.75	1.18	2.7	13
E. f. filata	Brazil, Lassance	BraL	19	0.72	0.9	1.05	2.85	14
E. f. filata	Brazil, Pau da Fome	BraF	19	0.75	0.78	1.17	2.7	14
E. f. minor	Peru, El Campamiento	Per2	21	0.9	0.93	1.04	2.94	16
E. f. minor	Peru, Chanchamayo	Per3	20	0.87	0.9	1.07	2.85	15
E. f. minor	Bolivia, Pcia Sara	Bol3	21	0.75	0.87	1.1	3.15	15
E. f. minor	Bolivia, Yungas	Bol4	22	0.9	0.96	1.05	3.09	16
E. f. filata	Brazil, N. Teutonia	BraT	20	0.81	0.9	1.07	2.79	14
E. f. filata	Brazil, Ligaçao	BraG	20	0.72	0.87	1.08	2.94	15
E. f. filata	Brazil, Urucum	BraU	21	0.72	0.84	1.15	3	15
E. f. filata	Paraguay, Asunción	Par6	18	0.6	0.81	0.97	2.61	13
E. f. filata	Paraguay, Villa Rica	Par7	21	0.75	0.9	1.03	3	16
E. f. filata	Paraguay, Pto Cantera	Par8	18	0.66	0.75	1.14	2.7	14
E. f. filata	Argentina, Misiones, Iguazú Falls	Mis4	22	0.75	0.87	1.02	3.06	15
E. f. filata	Brazil, Chapada	BraCh	19	0.72	0.81	1.04	2.94	14
E. f. minor	Argentina, Jujuy	Juj1	21	0.81	0.87	1.12	2.7	15
E. f. minor	Bolivia, Caiza	Bol5	19	0.81	0.87	1.11	2.91	14
E. f. minor	Bolivia, Yacuiba	Bol6	19	0.84	0.81	1.1	2.88	14